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April 10, 1997

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M. St., NW, Room 222
Washington, D.C. 20554

RE: Ex Parte Presentation
Universal Service: CC Docket No. 96-45
Access Reform: CC Docket No. 96-262

Dear Mr. Caton,

Please enter the attached letter and document into the record of the above mentioned proceeedings.

Two copies of this Notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules.

Sincerely,

Richard N. Clarke /87/31/

Richard N. Clarke

Attachments

cc: Anthony Bush
Patrick DeGraba
William Sharkey
Whiting Thayer
Robert Loube
Vakunth Gupta
Brian Clopton

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April 10, 1997

The Honorable Reed Hundt
The Honorable Rachelle Chong
The Honorable Susan Ness
The Honorable Julia Johnson
The Honorable Kenneth McClure
The Honorable Sharon Nelson
The Honorable Laska Schoenfelder
The Honorable Martha Hogarty

RE: Proxy Cost Models for Universal Service

Dear Member of the Universal Service Joint Board:

The attached analysis addresses the allegations made by USWest and Sprint in their "Preliminary Review of the Hatfield 3.1 Model" attached to an *ex parte* filing made by Sprint on April 4, 1997. The BCPM sponsors argue that the claimed problems with the Hatfield Model are "...so egregious and pervasive as to make the Hatfield Model irreparable." This claim is misleading in the extreme. Most of the criticisms of the Hatfield Model are incorrect, and some are based on a fundamental misunderstanding of the model, which is surprising, because the model is fully documented in filings in this docket that are available to all parties. The few actual errors pointed out by the BCPM sponsors are minor computational problems that are easily correctable -- and are being corrected. In each case, the impact on total costs of correcting these errors is modest, and result both in increases and decreases in costs for various network elements. Preliminary results indicate that, on balance, the net effect of all valid corrections will be to reduce costs slightly from the results presented with the initial filing of release 3.1 of the Hatfield Model.

The most surprising, and deceptive, part of the Sprint/USWest analysis are critiques levelled at Hatfield for failing to account for population clusters that "actually exist." The criticism implies that BCPM is superior because it takes these clusters into account, when in reality, BCPM fails to model clustering of customers at all. Further, in their attempt to prove that Hatfield "shortchanges" rural areas, the BCPM sponsors show that Hatfield places the same amount of cable in two CBGs with very different sizes and population densities. Inspection of the BCPM results reveals, however, that it places ***less*** cable than Hatfield in both CBGs, and of the two CBGs, BCPM places less cable in the larger CBG.

As shown in a memo submitted as an *ex parte* filing by AT&T on April 8, 1997, the Hatfield Model is, by any reasonable set of evaluation criteria, the superior tool for estimation of both universal service and unbundled network element costs. Unlike the BCPM, it provides estimates of the costs of all components of the telecommunications network. It provides a more detailed and accurate input data set than does BCPM. It estimates costs consistently for all network elements, and permits detailed analysis of the effects of varying customer demand for all network components. It provides the flexibility to test the effect of varying over 660 user-adjustable parameters. All default input values and all model operations have been thoroughly documented, unlike the BCPM, which remains, in many aspects a "black box" model that relies upon proprietary and/or undocumented data sources and algorithms. In contrast, the Hatfield Model is completely open and auditable -- all of its data sources are public, all calculations in the model may be examined, and all intermediate results are captured for further analysis.

We look forward to continuing to work with you on the effort to develop a suitable model.

Two copies of this Notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules.

Sincerely,

Joel Lubin
AT&T

M. Pelcovits
Michael Pelcovits
MCI

Attachment

cc: Anthony Bush, Robert Loube, William Sharkey, Joint Board Service List, Charlie Bolle, Rowland Curry, Lori Kenyon, Sandra Makeef, Lee Palagyi, Barry Payne, Paul Pederson, Brian Roberts

Response to US West/Sprint *Ex Parte* of April 4, 1997

This paper responds to criticisms of the Hatfield Model, Release 3.1 contained in a document entitled "Preliminary Review of the Hatfield 3.1 Model" by USWest, Sprint and INDETEC International, dated April 7, 1997.

CBG Data

The BCPM sponsors discover that the locational mappings used in HM 3.1 differ from those in HM2.2.2, and differ from their views about the location of CBGs and wire centers. These concerns appear to reflect an incomplete familiarity of the BCPM sponsors with the HM 3.1 data documentation.

Locations differ between HM 2.2.2 and HM 3.1 because HM2.2.2 used old BCM-Plus data. These old data were based on latitude and longitude coordinates, while the newer data set developed by PNR and used in HM 3.1 uses mappings based on V & H coordinates. Because V & H coordinates are rotated roughly 30 degrees relative to latitude and longitude, their mappings will not match, but relative positions will be unchanged for engineering purposes.[1] Thus, the concordance the BCPM sponsors appear to expect between the PNR data and the old BCM-type data will not exist – unless the reviewer follows the HM 3.1 documentation and adjusts for the differences in coordinate systems.

User Inputs Not Always Used

The BCPM sponsors correctly note that some user inputs changed in the automated interface are not carried forward to the model calculations. Specifically, changes to the buried distribution cable structure sharing percentage in density zones other than 0-5 lines per square mile and changes to the assumed town lot size are not carried forward. Until a corrected version of the model is available, the buried distribution cable structure sharing percentage may be changed manually in the expense module.[2] The town lot size may be adjusted by opening the distribution module and changing the "inputs" worksheet, cell F38 to the desired value. The BCPM sponsors are incorrect regarding the regional labor multiplier -- changes to this value are indeed recognized by the model.

[1] A further change between HM2.2.2 and HM 3.1 was to interchange the alpha and omega angles. This results in CBGs being placed in mirror image position relative to before. All distances and relative positions remain fixed, thus introducing no error into the engineering process.

[2] The model should be run with default sharing percentages to produce an expense module. The sharing percentage may then be adjusted in the "Inputs" worksheet, rows 66-74, columns C-H. If the workbook is then recalculated (press F9), the adjusted sharing percentages will be reflected in the results.

Critical Input Data is Hard-Coded

The BCPM sponsors claim that "critical input data" is hard-coded. The specific "inputs" listed by the BCPM sponsors are not presented in the user interface as adjustable values, because, in the opinion of the model developers, these items are integral to the modelling approach used. Because the model is open and unlocked, these "inputs" can be modified by a user experienced in the use of Excel. Hatfield Associates would note that many more input assumptions are hard-coded in the BCPM than in the Hatfield Model, and that the Hatfield Model permits modification of many more inputs than does the BCPM.

Faulty Assumptions

The BCPM sponsors claim that the Hatfield Model caps lot size at 3 acres. This is incorrect. Lots within towns and villages are capped at 3 acres, which is not an unreasonable assumption. Lots in the surrounding area served by road cable can be of any size, and in many cases are ten or more square miles. This does ***not***, as the BCPM sponsors claim, result in a smaller geographic area being served. The full populated geographic area in each CBG is served.

The BCPM sponsors fault the Hatfield Model for "ignoring" clusters of locations that actually exist. Without mapping individual customer locations and engineering plant to serve each and every specific CBG in the country, any model must "ignore" existing clusters of customers. The Hatfield Model attempts to simulate the clustering of customer locations by making reasonable assumptions as to the number and location of clusters based on the percentage of land area within a CBG that is populated. In making these assumptions, a conservative approach is taken, where fewer clusters are assumed in CBGs where the unpopulated area exceeds 50%, and by assuming that unpopulated area exists both in the center of the CBG and at its periphery.

This criticism of the Hatfield Model by the BCPM sponsors is particularly ironic, since the BCPM does not attempt to model clustering of customers ***at all***. Contrary to the BCPM sponsors' assertion at page 8 of the paper, customer locations, orientation, and distance are ***not*** modelled in the BCPM using the road network. Rather mapping the road network to CBGs is used only as a crude method of estimating the populated area within a CBG.[3] Once this estimate is derived, the CBG is collapsed to a smaller square. This effectively assumes that all unpopulated area is located at the periphery of the CBG, and distorts distances within the CBG.

The BCPM sponsors offer an example of "size distortion" in the Hatfield Model by pointing to three CBGs in Missouri. First, the BCPM sponsors argue, the Hatfield Model places 85% of customers in Chilhowee, Missouri in an area of 2 square miles,

[3] Note that the BCPM's "mapping" to the road network is completely undocumented save for an attribution to "CBG area adjustments from files by Peter Copeland of US West."

within a CBG with a populated area of 76.9 square miles. What the BCPM sponsors fail to mention is that the remaining 15% of customers are placed by the Hatfield Model in the remaining 74.9 square miles of the CBG.

The BCPM sponsors fault the Hatfield Model for estimating similar amounts of cable to serve two CBGs of different sizes and population density. One might be led to believe that the BCPM would calculate cable lengths differently. Examination of BCPM results for these same two CBGs however, reveals that not only does the BCPM estimate similar amounts of cable for the two CBGs, but that the BCPM actually places more total cable length in the smaller CBG.

	Deepwater	Newberg
Populated Area (sq. mi.)	60.19	35.1
Area served by Hatfield	60.19	35.1
Area served by BCPM	22.07	14.79
Distribution distance - HM	312,269	311,907
Distribution distance - BCPM	220,339	236,288

Note that, after reduction of the CBG area according to the BCPM's road network buffering technique, less than one-half of the populated area in each CBG is actually served by the BCPM model's network. Note also that in both CBGs, the Hatfield Model places more total cable length than does the BCPM, reflecting that all of the populated area in each CBG is actually served.

Logic Errors

The BCPM model sponsors correctly note an error in the calculation of lot frontage in the Hatfield Model. Hatfield Associates is aware of this error, and a correction to the model is currently being tested. Preliminary results indicate that correction of this error will result in a modest increase in the cost of loops. For Sprint-Missouri, the weighted average loop cost increases from $22.94 to $23.22 with the correction.

More Logic Errors

The BCPM sponsors claim that the default value for the distance multiplier used to recognize difficult surface conditions is, by default, set to one, and that therefore difficult surface conditions are not recognized unless the user adjusts this value. This claim is patently false.

Two factors may be used in the Hatfield Model to adjust placement costs in difficult terrain: a distance multiplier and a placement unit cost multiplier. The distance multiplier is contained in the distribution module, at the "inputs" worksheet, cell F25. By default, this value is set to 1.2, such that, where difficult terrain is encountered, the length of cable (and supporting structures) is increased by 20%. A second factor, at the "inputs" worksheet, cell F29, can be used to increase unit placement ***costs*** (independently of cable length) where difficult terrain is encountered. Because the judgment of the Hatfield model developers is that difficult terrain is more typically avoided by routing around the difficulty than by going through the difficulty, this value is set by default to 1. As a user option, however, this value can be increased to reflect increased costs.

Logic Errors (continued)

The BCPM sponsors note that the Hatfield calculation for digital terminals is incorrect, and claim that, if the error were corrected, the cost of the network would increase from $1.5 million to $2.1 million for Sprint-Missouri, an increase of 36% (it is unclear whether the BCPM sponsors are referring to investment or annual cost).

Hatfield Associates is unable to replicate the results claimed by the BCPM sponsors. The results from the Hatfield Model as filed for Sprint-Missouri show an investment in digital terminals of $37,169,680. Correcting the calculation of the number of terminals results in an investment in digital terminals of $37,727,680, an increase of 1.5%. The weighted average loop cost for Sprint-Missouri increases from $22.94 to $22.99 with the correction, an increase of only two-tenths of one percent.

Omissions

The BCPM model sponsors note that pole investment is "missing" in dense areas. This is not an omission. As indicated clearly in the Hatfield Model documentation, in dense urban areas, aerial cable is block cable attached to buildings rather than placed on poles. The cost of building attachments is included in the EF&I costs of aerial cable.

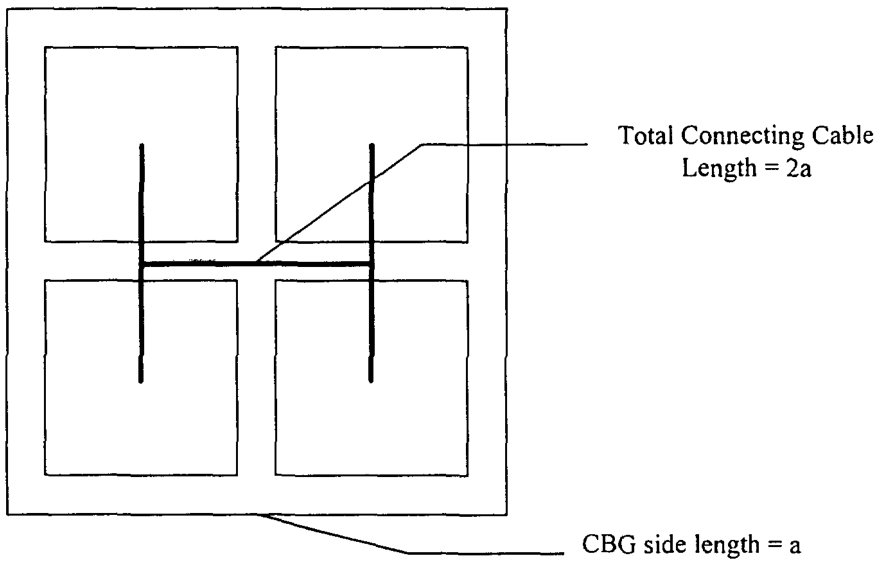
The BCPM model sponsors note that manhole investment is "missing" from the calculations of distribution costs. This is not an omission. Manholes are not used in distribution plant. Manhole investment is properly included in the calculation of feeder and interoffice costs.

The BCPM model sponsors claim that horizontal connecting cables are left out of the calculation of distribution costs. This is simply incorrect. Cell AI of the "calculations" worksheet in the distribution module contains a reference to cell AU of the same worksheet, which is the investment in connecting cables.

The BCPM sponsors are correct that riser cable investment is calculated but not included in final costs. Hatfield Associates is aware of this problem, and a correction to the model is currently being tested.

The BCPM sponsors are correct that distance is not calculated for the maximum size road cable. However, this error has no effect on costs, because 2400 pair cable is never encountered in serving the sparsely populated areas served by road cable.

The BCPM sponsors claim that subfeeder cable is incorrectly omitted in cases where the main feeder route intersects the CBG boundary. This is incorrect.



The following cases assume a symmetric arrangement of CBGs above and below the nominal horizontal feeder route.

If the feeder route does not intersect the CBG, the model correctly computes subfeeder distance and investment.

If the feeder route intersects the CBG, three cases must be considered:

Case 1 -- feeder route coincides with the lower CBG boundary

required subfeeder cable distance = 1.5a
equipped connecting cable distance = 2a
overstatement of cable = 0.5a
(requires no connecting cable is subfeeders are run directly from the feeder cable to the center of each cluster)

Case 2 -- feeder route bisects the CBG

required subfeeder cable distance = 0
equipped connecting cable distance = 2a
required connecting cable distance = a (= 4 x a/4)
overstatement of cable = a

Case 3 -- feeder route intersects CBG ¼ of the CBG length from the lower boundary (note that, under the symmetry assumption, this is the average case)

required subfeeder distance = a
(no connecting cables required if subfeeder extends from the feeder cable to the center of each cluster, two of which it already passes through)
equipped connecting cable distance = 2a
overstatement of cable = a

The BCPM sponsors are correct that the main road cable distance should be multiplied by four (or by two in the case where two clusters are modelled). Hatfield Associates is aware of this problem, and a correction to the model is currently being tested.

Conclusion

While some of the criticisms of the Hatfield Model in the BCPM sponsors' paper are well-taken, many are not. Furthermore, all of the valid criticisms do not reflect any fundamental flaws in the Hatfield Model, are easily correctable -- and are being corrected. The Hatfield Model sponsors regret that the BCPM sponsors have not made available for public inspection documentation of their model's data inputs, digital loop carrier, switching, and drop costs and operating expenses so that they may be scrutinized for errors. Verification of the accuracy of these cost items, which account for well over 50% of the BCPM's calculated cost, is critical if a correct choice of proxy model is to be made.